

SYLRAMIC™ SiC FIBER

Now Available Commercially!

Sylramic™ SiC Fiber is a 10 μm diameter crystalline silicon carbide (SiC) fiber. It is now manufactured by COI Ceramics, Inc. and is commercially available in tow or woven product forms. Additional product information is provided on the other side of this brochure. Contact our technical staff at 801.251.8111 or 801.251.8049 for delivery needs and pricing.

BACKGROUND

COI Ceramics, Inc. (COIC) is the leading supplier of high temperature *Sylramic™* and *Nicalon™* family fibers, and has been manufacturing ceramic matrix composites



(CMC) since 1999. Our San Diego facility specializes in *Sylramic™* SiC Fiber manufacturing and customer-specific CMC manufactured products. Our Salt Lake City facility serves as the worldwide distribution and customer service center for our ceramic reinforcement products.

In 2003 COIC procured the intellectual property and equipment assets for *Sylramic™* SiC Fiber manufacturing and has since invested in facilitization and equipment set-up/checkout.

In mid-2003 the Airforce Research Laboratory (AFRL), Materials and Manufacturing Directorate, contracted with COI Ceramics for the revalidation of *Sylramic™* and *Sylramic™-iBN*. *Sylramic™* SiC fiber process validation lots have been manufactured and property test results compiled. The COIC *Sylramic™* SiC Fiber is statistically equivalent to the historical fiber database COIC's *Sylramic™* Fiber properties database is available on request.

Under the AFRL, Materials and Manufacturing Directorate Program, COI Ceramics is working in collaboration with NASA to demonstrate and validate the *in-situ* Boron Nitride (iBN) process developed by the NASA Glenn Research Center, Ceramics Branch. *Sylramic™-iBN* commercial availability is planned for early 2005.

USES

Sylramic™ SiC Fiber is used as reinforcement in structures such as ceramic, plastic, and metal matrix composites. These products are used in severe environments such as aircraft and land-based turbine engines, hypersonics, thermal protection systems and chemical manufacturing. *Sylramic™* SiC Fiber is used as a composite reinforcement to increase the part strength, toughness, and high temperature creep resistance.

PRODUCT FORM

Sylramic™ SiC fiber is a textile grade continuous tow (yarn) made up of 800 filaments with a denier of 1600. Each filament is 10μm in diameter and is coated with a polyvinyl alcohol (PVA) sizing for improved handleability.

Sylramic™ SiC Fiber Tow

Continuous tow is supplied on 3 inch diameter cardboard spools. Lengths up to 800m (145g weight) are available. Tow length may vary depending upon availability and customer requirements.

Sylramic™ SiC Fiber, Woven

Cloth is available in standard weaves such as plain (PW), 5 harness satin (5HS) and 8 harness satin (8HS). As a textile grade yarn, Sylramic™ SiC Fiber can be readily incorporated into a variety of weaves, woven tapes, braids, etc. A network of US contractors exists to respond to your exact needs. Contact COI Ceramics to discuss specifics and receive further information.

SPECIAL PROPERTIES

Sylramic™ SiC Fiber has excellent room temperature strength and stiffness. The fiber has excellent creep resistance, maintaining strength and stiffness for extended times at extremely high temperatures (1400C [2252F]). These fiber properties are due to its chemical composition, crystalline structure, small crystal size, and very low oxygen content. This also allows it to have excellent wear and corrosion resistance capability. See Table 1 for typical properties and composition data.

Sylramic™ SiC Fiber overcomes the disadvantages of other materials. Oxide fibers and superalloys may lose their mechanical properties above 800C (1472F). SiCO fibers lose their mechanical properties above 1000C (1832F). Amorphous SiC fibers lose their mechanical properties above 1200C (2192F). Larger diameter (100µm), crystalline SiC fibers are not easily woven.

SAFE HANDLING INFORMATION

Product safety information required for safe use is not included. Before handling, read the Material Safety Data Sheet (MSDS). A MSDS is available from COI Ceramics.

LIMITED WARRANTY

COI Ceramics believes that the information contained herein is an accurate description of the typical properties and uses of the products, but it is your responsibility to test the material to determine its performance and safety for your application. The sole warranty is that the product meets current material certification provided with each delivery. COIC specifically disclaims any other express or implied warranty.

TABLE 1: TYPICAL SYLRAMIC™ PROPERTY & COMPOSITION DATA

| Attribute / Property | Units | Typical |
|-----------------------|------------------------------|----------|
| Diameter | micron | 10 |
| Denier | g/9000m | 1600 |
| Filaments | ea | 800 |
| Density | g/cm ³ | >2.95 |
| Oxygen | wt% | <0.5 |
| Tensile Strength (RT) | ksi | >400 |
| Tensile Modulus, (RT) | Msi | >45 |
| Thermal Conductivity | W/m-K | 40-45 |
| Composition | Crystal Size (micron) | % |
| SiC | 0.1-0.5 | 96 |
| TiB ₂ | 0.5 | 3 |
| B ₄ C | 0.1 | 1 |
| Oxygen | na | 0.3 |

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